

DETAILS DOCUMENT

MOBILE PCB

DESTRUCTION FACILITIES

Technology and Site Approvals

Demonstration Testing

Operational Controls

April, 1986



Environment
Ontario

Jim Bradley
Minister

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BACKGROUND

PCRs

Polychlorinated biphenyls (PCRs) are a class of man-made organic chemicals produced by the direct combination of chlorine and biphenyl. They are generally clear, colourless viscous liquids which have the appearance of mineral oil. They are virtually insoluble in water and in fact are denser than water such that they sink to the bottom when added to water. PCRs are stable, non-flammable and resistant to chemical attack.

PCB Use

The dispersive uses of PCBs were as extenders and plasticizers in a variety of sealants, caulking and coatings, as additives in carbon papers and printing inks and as automotive and industrial hydraulic and heat exchange fluids. As these materials were discarded, the PCR component became dispersed in the environment.

Closed-system use included electrical insulating fluid applications in commercial and industrial electrical transformers and capacitors and in some industrial heat transfer systems.

Canadian regulations and corresponding legislation in the United States, have banned all uses of PCR except in existing electrical equipment operating prior to July 1980.

Hazards Associated with PCRs

For many years, isolated reports in industrial medical literature concerning the toxic effects of PCRs attracted little general interest. In terms of acute toxicity, the level of exposure necessary to cause an acute and immediately harmful effect, PCRs are relatively low on the scale and significantly less toxic than many other more common industrial and consumer chemical products. Direct contact with high concentrations of pure PCB may produce health effects ranging from mild skin rash (depending on the degree of exposure) to severe toxicity if significant quantities are ingested.

As equipment became available in the 1960s to enable the measurement of trace levels of PCB in the environment, the significance of these environmental levels began to be assessed by numerous research workers conducting animal feeding studies. The results of these studies indicated the potential for PCB to be a cancer-causing substance and confirmed the potential to interfere with reproductive processes in animals.

There is little scientific evidence to indicate that any of the chronic effects shown in animal studies are exhibited in humans either exposed to PCB in the workplace or exposed to the current levels in the environment. Taking this into consideration, it is still a matter of prudence for environmental and health authorities to take measures to restrict and prevent human exposure to PCBs. Exposure to PCBs remains a matter of public concern. It is not, however, a matter which warrants the degree of public alarm so often associated with PCB spills or other evidence of release of PCBs into the environment.

The real environmental concern is that PCBs are very stable in the environment and are absorbed and accumulated by many life forms. PCBs become more concentrated as they pass up food chains from one life form to another (bio-magnification). They are present in some foodstuffs, particularly those derived from fish and animals that are near the top of food chains. As well, PCBs are present in trace levels in ambient air and in natural waters and sediments.

The principal health concern centers on this passage of PCBs up food chains, such that they gradually become concentrated in the fatty tissue of fish, birds and animals which may form part of the human diet.

Levels of PCBs in edible fish are of immediate concern, particularly from the standpoint of consumption of fish caught by sports fishermen. Commercial fish catches in the Great Lakes cannot exceed the federal guideline of two parts per million maximum PCBs. Sports fish, particularly salmonid species, show evidence of high levels of contamination. To meet this concern, Ontario publishes information on tests of fish for contamination and issues advisories on the consumption of fish which have accumulated traces of PCBs or other contaminants such as mercury.

PCBs are widely distributed in the environment. Airborne transport is evident from the fact that scientific data gathered from around the world show the presence of PCBs in areas remote from industrial influence such as Bermuda, Hawaii and the polar ice cap. Detectable levels are found in the vicinity of most urban and industrial centres in North America.

PCBs in Ontario

An estimated 6 million litres (1.25 million gallons) of PCB liquids are in service in Ontario. In addition, about 500,000 litres of high level PCB wastes are in storage awaiting disposal. This will gradually increase as PCB-filled electrical equipment is replaced or taken out of service.

Environmental and health concerns over PCBs of the 1970s followed the extensive media coverage of PCB incidents and heightened public awareness about environmental contaminants. As a result, the Ontario public has become increasingly apprehensive about the location and operation of any facility to store, treat, or dispose of PCBs.

Recognizing the need to inform the public about the properties and effects of PCBs, the need for ultimate disposal methods and the need for public involvement in plans to destroy PCB wastes, the Ontario Ministry of the Environment consulted with the public on its proposals to facilitate and regulate the siting and operation of mobile PCB destruction facilities in Ontario by the process outlined below:

- ° A Discussion Paper was distributed to 180 municipalities with PCB storage sites, 350 public utilities and a variety of associations, proponents of technologies and interest groups. Site selection and operational criteria that could be used as a basis for a regulation under the Environmental Protection Act were presented for discussion.
- ° After evaluating the response, the Ministry of the Environment decided to proceed with the development of a specific approvals process for such facilities, and an active public consultation program to increase the level of public participation.
- ° In September 1983, a Ministry of the Environment Task Force was formed to expedite the development of the regulatory proposals and to formulate and implement a public consultation plan which would seek public acceptance of the concept of using mobile facilities and obtain public input to the development of requirements for the operation and siting.
- ° From August 1983 until May 1984, the PCB Task Force met with municipal staff of 20 communities, several industries and utilities owning substantial quantities of inservice or waste PCBs, potential proponents, public interest groups, the Ontario Federation of Labour, and representatives from the U.S. Environmental Protection Agency and Environment Canada.
- ° The Ministry proposal was revised based on the public feedback and then the revised proposal was sent to a mailing list of over 800.
- ° Subsequently, 18 informal "open houses" were held for the public to discuss their questions and concerns with Ministry staff on an individual basis. Information on the history and background of PCBs, environmental and health concerns, the Ministry's regulatory proposals and

illustrations of two kinds of mobile technologies were available. Some 455 people attended the information sessions.

- ° The PCB Task Force evaluated the suggestions and revised the proposal incorporating as many of the suggested changes as possible into the "Preliminary Hearing Document on Proposals for the Regulation of Mobile PCB Destruction Facilities in Ontario, September 1984". The document was extensively circulated and the Minister of the Environment submitted the document to a Royal Commission for a full public Inquiry.
- ° The proposal was based on existing Ministry guidelines, regulations and criteria for the protection of human health and the environment with additional requirements incorporated to address concerns raised during the public consultation program. It was generic in nature and designed so that any facilities which could demonstrate that they met the proposed requirements could be approved. No specific technologies were selected or recommended. It set out the ground rules by which facilities and their technologies would be allowed to locate and operate in Ontario.

Two classes of facilities were proposed, incineration or thermochemical processes (Class 1) and those which chemically destroy PCBs and allow the associated organic matrix to be recovered (Class 2).

- ° After more than six months of hearings involving nine full time parties and 81 part-time parties and which produced some 13,870 pages of transcripts and 185 exhibits based on the evidence provided by 96 witnesses, the Commission delivered a report to the Minister (July 3, 1985) which endorsed the key elements and principles of the Ministry proposal.
- ° On September 6, 1985, the Minister of the Environment announced the government would incorporate the Commission recommendations in the proposed regulatory and administrative framework, but would go beyond the original proposal and the recommendations of the Commission in one key area; all PCR-incineration proposals will retain the requirements for public hearings on the technology to be used and the site approval. Also, the measures set out to ensure public awareness and to involve the community in the application of destruction technologies have been expanded and improved upon to go beyond the recommendations of the Commission.

° The following documents were developed in response to the recommendations of the Commission of Inquiry:

- An application form for Mobile PCB Destruction facilities;
- Guidelines for proponents on how Quality Assurance/Quality Control (QA/QC) aspects are to be addressed in applications for Certificates of Approval; and
- A guidance manual for handling applications for approval of technology to be used by approvals staff and to provide guidance to proponents and the public on how applications will be evaluated.

The Details Document

The following document updates Chapters 9 and 10 of the Ministry of the Environment's Preliminary Hearing Document which set out the Ministry's position for the Commission of Inquiry. The format and details received only minor changes to incorporate the recommendations of the Commission of Inquiry, to improve the wording in a few instances and to clarify the difference in requirements between the process of obtaining approval for commercial operation and arranging for demonstration testing.

This document provides the details required by the owners of destruction technologies who wish to apply for approval to operate in Ontario. It will assist the owners and custodians of PCBs - those in use and those currently stored as waste - in co-operation and consultation with their neighbours, to work together and get on with the job of safe destruction of PCBs. It will also be of interest to the general public.

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1.0 APPLICATION FOR APPROVALS AND TESTING REQUIREMENTS FOR MOBILE PCB DESTRUCTION FACILITIES

1.1 Compliance Requirements

Ontario has developed a Regulation and detailed administrative supporting documents to facilitate the use of mobile destruction units to destroy polychlorinated biphenols (PCBs). The process involves 2 classes of mobile technology.

Class 1 - use incineration or other thermo-chemical process to destroy PCBs; and

Class 2 - use chemical means to destroy PCBs with recovery of the associated organic matrix.

These technologies will operate on three classes of sites:

Class 1 Site - where a Class 1 unit operates;

Class 2 Site - where a Class 2 unit operates; and

Class 3 Site - where a Class 2 unit operates by connecting to a transformer for which the fluid is treated and returned to that transformer.

To obtain approval to operate mobile PCB destruction facilities in Ontario, it must be demonstrated that the facilities can comply with the environmental standards, operational controls, monitoring and record-keeping requirements set out in the Mobile PCB Destruction Regulation (included as Appendix 1.0), applicable Ministry policies, guidelines, standards and criteria and this administrative package. The procedures specified herein are designed to enable a proponent to become familiar with all Ministry requirements to facilitate the demonstration of compliance with these requirements.

Testing procedures have been developed for application to any mobile PCB destruction facility for which approval may be sought to operate in Ontario.

1.2 Need for Demonstration

When a proponent applies for approval to operate mobile PCB destruction facilities in Ontario, the Director of the Environmental Approvals and Land Use Planning Branch of the Ministry of the Environment must decide whether:

- a) sufficient reliable, technical data are available from the operation and/or testing of such facilities to establish to the Director's satisfaction the capability of the facilities to meet the Ministry's standards, guidelines and criteria without undergoing any additional testing; or
- b) data available from the operation and/or testing of such facilities are sufficient to satisfy the Director that the facilities may have the potential to meet the Ministry's standards, guidelines and criteria, but some additional testing is required; or
- c) sufficient reliable data from laboratory or bench scale studies of the proposed technologies are available to satisfy the Director that the proposed commercial scale facilities have the potential to meet the Ministry's standards, guidelines and criteria and that agreement to a demonstration test of the facility in Ontario is warranted.

1.2.1 Approval of Facilities Without Demonstration

Approval of facilities without requiring a demonstration will be considered if and when a proponent can satisfy the Director of Environmental Approvals and Land Use Planning Branch that the proposed facilities can meet Ontario's standards, guidelines and criteria. To support such an application for approval, the proponent must submit a report such as as stipulated in Section 3.5.

The report must contain results of tests of the proposed facilities using the procedures specified herein. The tests should be of at least such duration as stipulated. All engineering, process and monitoring details needed, including point of impingement calculations, to assure the Director that the facilities can consistently meet Ontario's environmental requirements should also be submitted. The Director will determine the adequacy and reliability of the data submitted. Data must be submitted from facilities which are comparable in design and capacity to the facility for which approval is being sought.

Based on the completeness and quality of the data submitted, the Ministry may:

- a) approve of the facility without further testing;
- b) refuse approval based on the information provided;

- c) require the collection and analysis of some additional data using methods approved by the Ministry. These data may, upon prior agreement with the Ministry, be obtained where such facilities are currently located even if outside of Ontario; or
- d) require a comprehensive demonstration test in Ontario to be performed in accordance with the specifications in this document (Section 3.0) and any operational requirements appropriate to the specific technology being tested.

2.0 APPROVAL PROCESS AND OPERATION CONTROLS FOR MOBILE PCB DESTRUCTION FACILITIES

INTRODUCTION

The administrative protocol outlined here identifies those general procedures that must be undertaken to obtain Ministry approval beyond the requirements of the Mobile PCB Destruction Regulation (Appendix 1.0).

In addition, Ministry commitments to public notification, inspection of facilities, environmental monitoring, regulation of waste transport and the application of other provincial regulatory requirements are identified.

2.1 Approvals

General

Technologies that have proven that they can meet the regulatory standards, as well as applicable guidelines and criteria, will be issued a Certificate of Approval under Part V of the Environmental Protection Act. A public sector proponent of mobile PCB destruction facilities would also require an approval under the Environmental Assessment Act.

Facilities that have technology approval may be sited at any location where proponents have satisfied the site selection standards contained in the Regulation, have had a site hearing if a Class 1 facility, have obtained a site Certificate of Approval under the Environmental Protection Act and any local permits or approvals that may be required.

Site approvals will be issued on a time-limited basis with detailed provisions to control the interval between and duration of return visits.

Approval for the actual destruction activity as a waste management system or a waste disposal site is required under Section 27 of the Environmental Protection Act.

In addition to the approvals for technology and each specific site under Section 27 of the Environmental Protection Act other environmental approvals are required under existing legislation. Approval for air emissions (if any) will be required under Section 8 of the Environmental Protection Act. Where liquid effluents are not being discharged to sanitary sewers, approval for discharge of these effluents to the environment is necessary under Section 24 of the Ontario Water Resources Act.

All approvals, (except the Class 2 and 3 site approvals), will be processed by the Ministry's Environmental Approvals and Land Use Planning Branch. Class 2 and 3 site approvals will be processed by the Ministry's regional office covering the area in which the proposed site is located.

To obtain the approvals, applicants are required to provide various supporting documents. Under the Environmental Protection Act Part II (Section 8) for air emissions, applicants are required to submit plans, specifications and other information and to carry out and report on any tests or experiments relating to the plant, structure, equipment, apparatus, mechanism or thing or to the methods and devices to be employed to control or prevent the emission or discharge into the environment. The Ontario Water Resources Act Section 24 requires the submission of plans, specifications and an engineer's report of the works to be undertaken, and the location of the discharge of effluent, together with such information as the Ministry may require, prior to an approval being granted.

In practice, an application for a Certificate of Approval for a technology normally contains full process details and drawings and engineering details of any effluent treatment or atmospheric emission control facilities, together with site details. As part of the data submitted, or required, if innovative technology is involved a technology specific protocol is also required to be submitted indicating how the proponent can verify emission levels.

Only upon demonstration that equipment can operate satisfactorily within the Ontario Water Resources Act and the Environmental Protection Act and associated regulations, is a Certificate of Approval granted.

2.2 Certificates of Approval

Because the regulatory framework has been designed to apply to any technology and site, requirements that may be related to concerns about a specific technology and/or site will be specified as conditions to the Certificates of Approval issued for the operation of the facilities and for the sites for which approval is sought.

2.2.1 Technology Approval (Class 1 and 2 Technologies)

A Certificate of Approval is required for each PCB destruction technology. This approval must be obtained from the Environmental Approvals and Land Use Planning Branch of the Ministry. Technologies must demonstrate

that they can meet the Ministry's requirements (and for Class 1 technologies have had a hearing under Part 5 of the Environmental Protection Act) before receiving approval to operate commercially in Ontario. If demonstration testing in Ontario is required, written authorization of the Ministry must be obtained prior to commencement of any testing of commercial scale mobile facilities for the destruction of PCBs. Demonstration testing must be carried out in accordance with procedures specified by the Ministry in Chapter 3. A Certificate of Approval for the technology will be issued upon completion of successful testing and submission of a report of the results.

Conditions on the Certificate of Approval for technology issued under Part V of the Environmental Protection Act may include but not be limited to:

- a) the maximum PCB waste feed rates and PCB concentration for which operation is permitted;
- b) the process conditions which must be attained prior to introduction of any PCB waste to the facilities;
- c) those process parameters which must be continuously and automatically monitored;
- d) the ranges of process parameters under which the facilities may be operated;
- e) the values of process parameters at which automatic shutdown of facilities is required; and
- f) other conditions under which the Ministry will order immediate shutdown of facilities.

These conditions will have been determined during tests carried out in Ontario to demonstrate that the technology can meet existing and proposed applicable Ministry standards or in the course of other testing or operation outside of Ontario.

2.2.2 Site Approval (Class 1, 2 and 3 sites)

Certificates of approval are required for each location at which facilities are to be temporarily operated. For Class 1 sites, (which require hearings) Certificates of Approval must be obtained from the Director of Environmental Approvals and Land Use Planning Branch. For Class 2

and 3 sites Certificates must be obtained from the appropriate regional Ministry office prior to commencement of operations at the specific site. Conditions on Certificates of Approval to locate facilities at a specific site issued under Part V of the Environmental Protection Act may include, but not be limited to:

- a) approved method of handling of liquid effluents and solid residues;
- b) any specific measures required to prevent discharges, accidental spills or leaks directly or indirectly into watercourses;
- c) the duration for which the Certificate remains in effect;
- d) any conditions which constitute grounds for immediate shutdown of facilities by Ministry staff;
- e) a requirement for a performance bond in excess of \$50,000 because of specific site situations;
- f) the maximum volume of PCB wastes which may be present on the site; and
- g) approved container decontamination and disposal methods, where appropriate.

It is recommended that sites be selected from lands considered suitable for industrial, waste disposal or sewage treatment uses and that the proponent seek advice on potential sites from local municipal officials such as the municipal engineer and Medical Officer of Health prior to requesting a site approval from the Ministry.

The proponent must demonstrate to the appropriate director that all requirements pertinent to receiving approval to operate at a site are satisfied prior to the issuance of Certificates of Approval. The following information in support of a request for approval to operate at a specific site must therefore be submitted:

- a) identification of the waste management system Certificate of Approval (technology approval) for the destruction facilities to be used at the specified site;
- b) copy of a letter from the Clerk of the local municipality in which the site is located indicating that all required local permits have been obtained;

- c) copies of letters of transmittal of a contingency plan filed with the local City Clerk, Regional or County Clerk (if appropriate), police and fire officials, the local Medical Officer of Health, and the Ministry of the Environment regional office;
- d) a plan of the proposed site and immediate surroundings indicating how it conforms with required site characteristics, including proposed location of facilities and storage areas, distances from nearby buildings, farm livestock buildings, feedlots, livestock and feed processing or handling establishments, topography, location of watercourses, drains, nature of site surface;
- e) filing of the appropriate performance bond information;
- f) an estimate of the quantities and concentrations of PCB waste to be processed and the proposed duration of the operation at the site;
- g) a record of previous dates and duration of operations within the local municipality in which the proposed site is located;
- h) site specific calculations of the maximum point of impingement concentrations for PCBs, PCDDs and PCDFs in accordance with the procedure specified in Ontario Regulation 308;
- i) proposed methods of disposal of all process by-products;
- j) proposed site preparation and restoration procedures, including provisions for temporary storage of PCB wastes;
- k) details on PCBs which will be moved to the destruction site (owner, volume, nature, methods of storage and movement);
- l) proposed volumes of PCB wastes to be stored on site;
- m) proposed methods to be used to prevent precipitation contamination by PCBs, or to minimize, contain and treat precipitation that may become contaminated; and

- n) proposed container decontamination and disposal methods for containers and cleaning wastes, (where appropriate).

2.3 Operating Requirements for Commercial Operations

2.3.1 Assembly and Operation of Facilities

The proponent shall demonstrate (to the satisfaction of the Director) that the facilities are mobile and can be operated in their commercial mode within the time constraints specified in the regulation.

Prior to the start-up of Class 1 destruction units, the system shall be inspected by Ministry staff and operating personnel for the integrity of the various components. For all destruction units, all pipe joints, valve and pump glands must be free of leaks and all flexible hoses in good condition.

2.3.2 Operational Controls

The facilities shall at all times be operated in accordance with the waste storage and handling, transportation, contingency planning, security and occupational health and safety requirements stipulated in the PCB Regulations. (Ont. Reg. 11/82 & the Ont. Reg. shown in Appendix 1.0).

In addition, facilities must be designed and operated so that fugitive emissions of PCB vapours, spills and accidental PCB releases are minimized and contained. A detailed description of materials handling and control procedures, including equipment design features intended to prevent spills and vapour losses, must be submitted to the Ministry as part of the application for approval. Designs must take into consideration published Environment Canada and Ministry guidelines and codes of practice such as

- 1) "Handbook on PCBs in Electrical Equipment" Environmental Protection Service, Environment Canada, December, 1982; and
- 2) "Origin and Management of PCB Waste", Ministry of the Environment, April, 1984.

Materials of construction compatible with PCB wastes are to be used. Flanges, joints and couplings in piping arrangements should be minimized. Tank vent and other sources of vapour loss should be vented through activated carbon cartridges or returned to the destruction process in order to control or destroy PCB vapours. If a proponent is able to prove that PCBs will not be emitted at rates above permitted ambient levels, the use of control measures will not be required.

Measures should be taken to exclude precipitation from spill containment areas or, in the alternative, to provide methods of collecting and treating all PCB contaminated precipitation.

No waste may be introduced to the facilities until the operating conditions necessary for the destruction of PCBs have been attained.

2.3.3 Operator Training

The proponent shall submit documentation to the satisfaction of the Director that the operators of the mobile PCB destruction facilities have been properly trained to operate the facilities under normal and emergency situations. In particular, proponents should provide documentation that their operators are trained in the following areas:

- a) the basic physical and mechanical features of the mobile PCB destruction facilities, for which approval is being sought;
- b) the function and location of the equipment within the facilities including the control panel, and safety features of various control units;
- c) handling guidelines for PCB wastes and any substances used for their treatment such as, for example, caustic soda, oxygen, sodium, nitrogen;
- d) occupational health and safety guidelines for PCB wastes and any substances used for their treatment, including:
 - knowledge of the Occupational Health and Safety Act;
 - safety procedures for handling PCB wastes and substances required for their treatment;

- knowledge of the function and use of different kinds of safety equipment available in the facility, such as fire extinguishers, protective clothing and respiratory equipment;
- e) environmental concerns related to PCB wastes and substances used for their treatment;
- f) basic physical and chemical knowledge of PCB wastes and substances used for their treatment, including:
 - corrosivity, reactivity, flammability, explosivity and toxicity;
- g) emergency handling procedures for PCB wastes and other substances required in the facilities for which approval is being sought, including:
 - procedures by which spills would be stopped,
 - different containment techniques that would be used,
 - procedures by which fires would be extinguished; and
- h) emergency reporting procedures, including reporting of spills to government agencies as required in the contingency plan to be filed by the owner.

2.3.4 Supplementary Fuel Composition

If supplementary fuel is required for operation of the facility, a detailed chemical analysis shall be submitted with the application. Any material found in the fuel which may result in contaminant emissions must be sampled for and included in the analyses. The use of waste solvent as a supplementary fuel is not permitted.

2.4 Site Selection for Commercial Operations

2.4.1 Distance from Receptors

To address public concerns and fire protection needs, a minimum separation distance between facilities and certain receptors is required. Lands suitable for industrial operations, waste disposal or sewage treatment are recommended for consideration as potential destruction sites.

Class 1 facilities and associated equipment and storage containers must be located at least 250 metres from occupied public buildings, residences, schools, hospitals, nursing homes, establishments involved in food processing farm buildings containing livestock, feedlots, and feed processing or handling establishments.

At Class 2 sites, the destruction associated equipment and storage containers must be at least 20 metres from occupied public buildings, residences, schools, hospitals, nursing homes, establishments involved in food processing, farm buildings containing livestock, feedlots, and feed processing or handling establishments.

For Class 3 sites, there is no specified separation distance because the PCBs are being handled in a closed loop and there are no significant emissions. The Director will only assign conditions requiring separation if the situation warrants such action.

2.4.2 Site Features

The terrain of the site on which facilities are to be operated shall be level and well graded. Surface materials of sites must allow for prompt and effective clean-up of all materials that spill or leak. Prevention of migration of spills into ground water is of prime importance when considering the suitability of surficial characteristics of potential test sites. In the event that sites do not have these characteristics, alternative measures acceptable to the approving Director may be used to prevent migration of spills.

All Class 1 and 2 facilities and associated equipment and storage containers shall be at least 100 metres from a watercourse. These destruction facilities should be isolated from openings to storm or sanitary sewer systems by placement of temporary, impermeable impoundments or barriers.

The required 100 metre separation distance does not always apply to operations at Class 3 sites. There may be a reduction of the specified separation distance from watercourses if the MOE Regional Director is convinced that a facility at such a site can be physically isolated from a watercourse as well as from sewer systems.

Any potential site which requires site preparation activities that disturb the ground should be verified with a regional archaeologist (named by the Ministry of Citizenship and Culture) to ensure that it is not the site of a cultural, historical or archaeological resource.

2.4.3 Site Preparation and Restoration

The proponent shall be responsible for ensuring that appropriate services, such as electricity and water supply are available. The proponent shall be responsible for preparation of the site and for site restoration after disassembly of facilities. The site shall be prepared and subsequently restored to the satisfaction of the Ministry.

2.4.4 Performance Bond

Proponents shall post a performance bond of at least \$50,000 (for each Class 1 site or each Class 2 facility) to ensure that funds are available for dealing with spills process upsets and/or site restoration. Where in the Director's opinion it is necessary to have a larger bond posted, a condition will be added to the Certificate of Approval. The Ministry or an authorized contractor will inspect the site of the Class 1 commercial operation within 7 days of disassembly and removal of facility and, due to the length of time required for analysis, will report on this inspection within 45 days. If no remedial measures are required, the Ministry will relinquish any claims on the performance bond.

2.5 Monitoring Requirements

Some detailed process, emissions, and environmental monitoring will be required during commercial operations. Operation of facilities after approval by the Ministry, will be controlled using continuous monitoring of process parameters integrated with automatic waste feed and/or process shut down controls.

Any excursion indicating exceedances of the Ministry air pollution guidelines or standards during operation must result in immediate shutdown of PCB feed until the reason for the possible excess emissions has been determined and the problem corrected.

2.5.1 Process Monitoring

Each different destruction technology will have a different set of parameters that are critical to the control of the destruction process and to the prevention of unacceptable environmental emissions. In incineration, for example, such parameters would include but not be limited to, combustion temperature, oxygen concentration, carbon monoxide concentration, carbon dioxide concentration, total hydrocarbon concentration, flow of neutralizing liquid to the scrubber and input feed analysis.

The proponent shall submit a process description, complete with critical process parameters that are to be continuously monitored to be reviewed by the Director as part of the technology approval. The ranges of the parameters within which acceptable emissions are achieved are to be established and/or confirmed during the earlier testing or commercial operations elsewhere. Any excursion outside of these ranges shall result in an immediate and automatic shutdown of the waste feed-stream and/or process until the conditions resulting in the process upset have been corrected.

2.5.2 Environmental and Emission Monitoring

The environmental and emissions monitoring requirements are designed to ensure that sufficient data are available to identify any significant environmental effects.

i) Stack Emissions

For Class 1 systems, the regulation requires that the mass air emissions from the system be sampled and analyzed for PCBs, dioxins and furans using sampling and analytical methods approved by the Director:

- i. During the first twenty-four hours of operation at each of the first three sites of operation;
- ii. At least once more for each of the first three sites of operation and, thereafter, at least once in any calendar year in which the system is in operation in Ontario; and
- iii. After any major repair or alteration to the system which is likely to affect the mass air emissions of these chemicals.

2.6 Steps for Public Notification/Input in the Procedures for Approval of Mobile PCB Destruction Facilities (Technology and Sites)

The following section highlights those steps in the approvals process of particular interest to possible proponents and the general public. This summary is for clarification only and is not meant to suggest that applicants are assured they will receive approval if they follow each step of the process.

2.6.1 Application (Class 1 and 2 Technologies)

- ° Proponent submits application to the Environmental Approvals and Land Use Planning Branch.

- ° The Ministry determines whether to:
 - (i) approve without further tests;
 - (ii) arrange for further tests outside Ontario; or
 - (iii) arrange for demonstration test in Ontario.
- ° The Ministry announces Receipt of the Application and the decision on whether further testing will be required.

2.6.2 Demonstration Testing Approval (Class 1 and 2 Technologies)

- ° If required by the Director, additional data is supplied by proponent in support of demonstration test proposal.
- ° Proponent consults with local officials on possible sites and selects one which is proposed to the Ministry.
- ° After the Director authorizes demonstration to proceed and issues the Air Certificate of Approval, the proponent formally notifies the clerk in writing of time, location, duration of the proposed demonstration testing at least 30 days in advance.
- ° Required local municipal approvals are obtained.
- ° A full copy of the formal application and details on the demonstration testing are made available to the local municipality for reference by local residents (local information registry).

2.6.3 Demonstration Testing (Class 1 and 2 Technologies)

- ° The proponent prepares a comprehensive report after demonstration testing and submits it to the Ministry as substantiation that approval should be granted for commercial operation. When the report is submitted to the Director a copy is to be sent to the local registry in the community where demonstration testing took place.
- ° Copies of Ministry correspondence with the proponent and Ministry inspection reports during demonstration testing will be forwarded to the local information registry.

2.6.4 (a) Technology Approval (Class 1)

- ° When there is sufficient technical basis to proceed with the formal review of an application for

technology approval, the Director of Environmental Approvals and Land Use Planning Branch will initiate the process which will result in a formal hearing under the Environmental Protection Act. Included in the formal process are formal notice requirements which will be augmented by expanded circulations list as set out in the regulations. As well in the hearing there are formal procedures involving evidence giving and cross examination.

- ° A proponent might elect to apply for technology approval and at least one proposed site of operation at the same time.
- ° After the Hearing, the report of the Hearing Board (the Environmental Assessment Board) is forwarded to the Director of Environmental Approvals and Land Use Planning to be considered prior to his issuance of the Certificate of Approval.
- ° If a site hearing has been conducted along with the technology hearing, copies of the Board's report and the Certificate of Approval are forwarded to the local information registry.

2.6.4 (b) Technology Approval (Class 2)

When there is sufficient technical basis to proceed with the formal review of an application for technology approval and all requirements are satisfied, the Director of Environmental Approvals and Land Use Planning Branch will proceed with issuance of a certificate of approval for a waste management system under Part V of the Environmental Protection Act.

2.6.5 (a) Site Approvals (Class 1 Technologies)

- ° Proponents are to advise communities of their intention to apply for approval for a Class 1 site, and to obtain the communities' advice (prior to submission of an application for approval) through correspondence or meetings, etc. Ministry staff will participate upon request.

- ° Provision of local details and public input might be enhanced through informal local discussions using a liaison committee established by the municipality. A liaison committee (consisting of a representative of the proponent, the local municipality, the regional municipality or county (if appropriate), the Medical Officer of Health, and the ministry) could review the available information and make recommendations to the Municipality to assist it prepare for the hearing.
- ° For approval of sites which were not reviewed previously in a Part V EPA hearing, the host municipality will initially be formally notified of the proponent's plans when the Ministry notifies the municipalities (both levels) of the application by forwarding the documentation to them for establishment of the local information registry.
- ° There will be a comprehensive hearing reviewing the request for approval to destroy PCBs at the site(s) outlined in the application. If there are multiple sites applied for, the hearing may have local sittings.
- ° The report of the Hearing Board will be forwarded to the Director of Environmental Approvals and Land Use Planning Branch for consideration prior to the issuance of a certificate of approval.
- ° The hearing decision and details of the approval will be provided for the local information registry.

2.6.5 (b) Class 2 Site Approvals (Class 2 Technologies)

- ° NOTE: These approvals will be issued by the MOE Regional Director.
- ° Proponents are to advise communities of their intention to apply for approval of a Class 2 site, and are to consult with local officials such as the municipal engineer and the Medical Officer of Health to obtain their advice prior to requesting a site approval from the ministry. Ministry staff will participate upon request. Provision of local details and public input might be enhanced through informal local discussions using a liaison committee established by the host municipality. Such a committee (representatives of proponent, municipality, Medical Officer of Health, region or county (if appropriate) and the Ministry of the Environment) could review the available information and provide assistance to the Municipality.

- ° Among the information which must be submitted in support of an application for approval is a copy of a letter from the local clerk(s) (municipality and regional or county if they have approval responsibilities in these areas) indicating that all required permits have been obtained. The application will detail all of the specifics of the proposed operation.
- ° A copy of the complete application package will be provided to the local municipality for establishment of the local information registry.
- ° Copies of all approvals reports and correspondence will be provided for the local information registry.
- ° Any reports and sample data resulting from the operation of the facility will be copied and forwarded to the municipality for placement on its information registry.

2.6.5 (c) Class 3 Site Approvals (Class 2 Technologies)

- ° NOTE: These approvals will be issued by the MOE Regional Director.
- ° Proponents are to consult with local officials to determine if they are aware of situations which might compromise the insitu destruction of PCBs. Such information would be included in the application to the Regional Director for approval of various sites. Ministry staff will participate in these consultations upon request.
- ° After MOE regional staff have confirmed that the location of the inservice equipment will permit safe PCB destruction and that a Certificate of Approval may be issued, the Regional Director will advise the municipality of the locations of the equipment which will receive insitu destruction of the PCBs, a minimum of 30 days prior to the start-up date.
- ° Copies of all the approvals documents will be forwarded to the local municipality for establishment of a local information registry.
- ° Any data/reports arising from monitoring of the operation will be copied and forwarded for inclusion on the registry.

2.7 Ministry Commitments

The Ministry undertakes the following commitments in the approval and supervision of mobile PCB destruction facilities:

2.7.1 Public Notification

Further to the notice provisions set out in Section 2.3, for Class 1 facilities, prior to the commencement of the hearing to consider the application for a Certificate of Approval for a site, the applicant will be directed to provide notice by notifying in writing the local Clerk, the regional or county Clerk (if appropriate), the Directors of the Boards of Education and the Medical Officer of Health, and by advertising at least three times in a daily newspaper serving the said municipality.

The notice will include the date on which the Hearing will commence, the location of the Hearings, the location of the site, estimated amount of waste to be treated, duration of operation at the site and a brief description of the technology.

For Class 2 facilities operating on Class 2 sites the Ministry will provide notice of the issuance of a site Certificate of Approval to the local Clerk, the regional or county Clerk (if appropriate), the Directors of the Boards of Education and Medical Officer of Health a minimum of 30 days prior to the date for which operations at the site have been authorized to commence. The notice will include the date on which assembly may commence, the location of the site, estimated amount of waste to be treated, duration of operation at the site and a brief description of the technology.

2.7.2 Inspection

To ensure that equipment is being operated in accordance with Certificates of Approval, the Ministry will, using staff trained to monitor the operation of mobile PCB destruction facilities, undertake regular surveillance of facilities and carry out spot checks on a random,

unannounced basis. Class 1 facilities will not be permitted to operate unless a ministry inspector is present. Spot checks will be carried out on operational Class 2 facilities a minimum of once daily the first time that facilities are operated commercially in Ontario and subsequently for operational Class 2 sites will occur not less than twice a week during operations at each new site. Such inspections will occur on a random basis and include evening and night time inspections if facilities are operating 24 hours a day. Class 3 operational sites will be inspected on a random, unannounced basis.

To guarantee that environmental quality is not impaired by the operation of a mobile PCB destruction facility, the Ministry or an authorized contractor will inspect Class 1 and 2 sites within seven days of cessation of operation and report within 45 days if remedial measures are required. If no remedial measures are required on Class 1 sites, then the Ministry will relinquish any claims on the performance bond.

In the event that after completion of operations at a site, residues of PCB detected in soils at the site significantly exceed the levels detected in the pre-operational inspection, the operator of the facilities will be required to undertake remedial measures to restore the site to an acceptable condition, in accordance with Ministry guidelines.

Any violation of the conditions attached to the Certificates of Approval will constitute a basis for the Ministry to order an immediate shutdown of the facilities until appropriate remedial measures are carried out by the operator.

2.7.3 Environmental Monitoring

Pre-operational, operational and post-operational environmental monitoring will be required for mobile PCB destruction facilities that have received Ministry approval. All monitoring will be carried out in accordance with sample collection and analysis methods stipulated by the Ministry.

i) Ambient Air

Ambient air monitoring will be undertaken by the Ministry or contractor authorized by the Ministry on a frequent and random basis around operating facilities to determine whether acceptable air quality is being maintained.

For Class 1 facilities, continuous air samples at a minimum of four locations will be collected and analyzed for PCBs the first time facilities are operated commercially in Ontario. Air samples will be collected and analyzed for PCDDs and PCDFs a minimum of at least one day per week of operation. After facilities have successfully operated commercially once, samples capable of being analyzed for PCBs will be collected at two locations a minimum of 2 days for each week of operation.

For Class 2 facilities, the ministry will collect ambient air samples and analyze them for PCBs for a minimum of 24 hours per 168 hours of operation at each new site. Ambient air sampling may be discontinued after Class 2 facilities have successfully operated commercially three times within Ontario provided no exceedances of air quality have been detected.

ii) Liquid Effluents

Operators of mobile destruction facilities will be required to analyze continuous or batch discharges of liquid wastes on a regular basis for PCB and other relevant parameters. Random spot checks on liquid effluent quality will be carried out by the Ministry or a contractor authorized by the Ministry. A minimum of one MOE spotcheck of effluents will be carried out for each five days of the first three commercial operations. Thereafter, the checks will be carried out on a random basis by the Ministry.

iii) Solid Wastes

Solid wastes that may arise from operations will be analyzed by the operator of the facility for PCB content prior to disposal. These analyses will be verified on a random basis by the Ministry.

iv) Pre and Post-Operations Site Monitoring (Class 1 and 2 sites)

To provide confirmation that environmental quality at mobile PCB destruction facility sites is not impaired, samples of PCB in air, soil and waters at the site and in the vicinity of the site will be collected and analyzed by the Ministry or by a contractor authorized by the Ministry both before and after operations.

2.7.4 Reporting on Operations and Post Operations Site Monitoring

Results of Ministry of the Environment monitoring analyses will be made available to the public by the Ministry as a report within three months of cessation of operation of facilities at any site. This report will be forwarded to the municipality with a copy for the local information registry.

2.8 Transportation of PCB Wastes

All waste transportation in Ontario is subject to the general requirements of Part V of the Environmental Protection Act and Regulation 309. Additionally, hazardous and liquid industrial waste including PCB waste are subject to the manifest requirements of Regulation 309. The transportation of PCB wastes from storage facilities may also subject to the requirements of Ontario Regulation 11/82.

Transportation of wastes to the site must be by approved waste carriers specifically authorized to handle PCB wastes and who have the appropriate equipment and trained personnel. Transfers and receipts will be documented under the Ministry of the Environment manifest system and the recording requirements of Ontario Regulation 11/82. Generators and receivers of wastes are required to record all transactions and to maintain such records for Ministry inspection.

In addition to these environmental requirements, generators and carriers must also comply with the federal Transportation of Dangerous Goods Act and its provincial equivalent (DGTA). The legislation covers manifesting, placarding, training and pre-notification.

2.9 On-Site PCB Waste Storage and Container Decontamination and Disposal

Containers used to bring PCB wastes to the mobile destruction unit site are expected to include bulk tank trucks, drums, and PCB equipment. They are to be stored in temporary, preferably sheltered storage facilities established at the site in accordance with the requirements stipulated in the regulations.

Wastes may not be transported to an approved destruction site until five days prior to commencement of operation. The volume stored should not exceed the volume required for five days of continuous operation. In certain situations, such as where this restriction would result in the incomplete filling of a transport vehicle at a storage site not contiguous to the destruction site, storage of volumes larger than 5 days throughput would be permitted at the destruction site. Such permission would be indicated as a condition on the site Certificate of Approval.

Tank trucks, after having been emptied of PCB wastes, will not require decontamination because they will be approved PCB waste haulage vehicles and hence re-usable to transport other PCB wastes. Decontamination of other PCB equipment will require specific authorization in the site Certificate of Approval. PCB contaminated drum and container may be returned to their owners and stored or re-used in accordance with Regulation 11/82. Alternatively, they may be rinsed three times with a solvent capable of being disposed in the mobile destruction facilities, e.g. diesel fuel, furnace oil, etc. The volume of solvent used for each rinse shall be at least equal to 10 percent of the drum or container volume. Rinsed drums and containers may be disposed in certified landfills (subject to the authorization of the owner/operator) as a non-hazardous waste or recycled for re-use or scrap metal recovery.

2.10 Site Preparation and Restoration

Preparation of the approved site prior to the assembly and operation of mobile PCB destruction facilities, and site restoration after disassembly and removal of the facilities are the responsibility of the operator. Site preparation may include such activities as grading, placement of temporary shelters and berms, and blocking of drains. The site is to be prepared and subsequently restored to a condition that is satisfactory to the Ministry. All temporary structures and earthworks, as well as containers and process by-products, are to be removed by the operator in accordance with any conditions stipulated on the site Certificate of Approval.

2.11 Noise

Noise levels associated with mobile destruction facilities must be controlled to comply with local municipal noise by-laws where applicable. Noise levels should be limited and at least consistent with ambient levels associated with the industrial or local environment where the facilities are to be located.

2.12 Other Requirements

The requirements addressed specifically in this document are those stipulated by the Ministry of Environment which has the responsibility for approving the operation and siting of mobile PCB destruction facilities. Operators will be expected to comply with other requirements, such as those of local municipalities and other government agencies. For example, operators must comply with local zoning provisions. They must obtain appropriate approvals for discharge of liquid effluents to local sewage systems and solid residues to local landfill sites.

Examples of requirements by two other Ministries are presented below.

2.12.1 Ministry of Citizenship and Culture

Any ground disturbance has the potential to affect any existing archaeological remains. It is not anticipated that the location of mobile facilities on temporary destruction sites will require any significant ground disturbance. However, any potential site which requires any site preparation activities that involve activities such as stripping, grading or trenching, should be discussed with a regional archaeologist to ensure that it is not the site of a cultural, historical or archaeological resource. The name of the archaeologist can be obtained by contacting the Ministry of Citizenship and Culture.

2.12.2 Ministry of Labour

In order to protect worker safety all mobile PCB destruction facilities licenced to operate in Ontario will be subject to the Occupational Health and Safety Act and its associated regulations.

The Ministry of Labour's current position on the handling of PCBs recommends a Time-Weighted Average Exposure Criteria (TWAEC) air level of 50 ug/m³ of PCB. TWAEC are the time-weighted average concentrations or levels of an agent for a 40-hour week to which it is believed nearly all workers may be exposed day after day without experiencing adverse effects. TWAEC's for exposure different from 40 hours are calculated by dividing the cumulative weekly exposure by 40.

The following work practices have been established by the Ministry of Labour for workplaces where PCB exposure may occur:

- a) Access to an area where PCBs are being handled or stored, shall be restricted to those workers who have been provided information, instruction and training in the handling of PCBs;
- b) An area where PCBs are being handled or stored shall be designated as a hazardous area by clearly visible notices at all entrances;
- c) Workers involved in the handling or storage of PCBs shall be supplied with and use personal protective clothing impervious to PCBs for the period of exposure;
- d) Quick acting deluge showers and eyewash fountains shall be provided;

- e) Workers, at work stations where ambient air concentrations of PCBs exceed a time-weighted average exposure of 50 ug/m^3 , shall be supplied with and required to use suitable air supplied respiratory protection;
- f) Good housekeeping practices shall be maintained and contamination of other areas of the work place with PCBs shall be prevented; and
- g) Written procedures to deal with spills and emergencies shall be developed.

In addition, operators are required to establish the following administrative controls:

- a) Workers considered to be exposed to PCBs should undergo preplacement and periodic medical examination as and when appropriate. The frequency of the medical reassessment should be determined by the examining physician; and
- b) Following a significant accidental exposure, workers should undergo a medical examination and followup examinations should be done three months and one year later. No more examinations are needed, unless PCBs health effects persist.

The Ministry of Labour has also issued a series of recommendations to apply to the handling of PCBs namely:

- a) avoid leaks, spills and splashes;
- b) provide flooring in the working area of solid concrete or other impervious material and curbing around equipment;
- c) ensure that pipes and tubes are visible and easily accessible for inspection and maintenance;
- d) label the containers to indicate correct handling procedures; and
- e) establish an educational program for maintenance workers.

Should equipment generate sound levels above ninety decibels Section 144(2) b) and (3) of the Occupational Health and Safety Act, (which specifies time limits for worker exposure at various decibel levels, and hearing protection requirements) would be applicable.

3.0 PROCESSING PROPOSALS FOR DEMONSTRATION TESTING IN ONTARIO OR ADDITIONAL TESTING ELSEWHERE

3.1 Authorization of a Demonstration

To obtain Ontario's authorization to carry out a demonstration test of commercial scale facilities, reliable test data must be submitted, based on either:

- a) operating results of the commercial facilities approved for operation within another jurisdiction; and/or
- b) testing results of pilot or bench scale facilities.

The data submitted must satisfy the Director that the demonstration can be carried out in accordance with the precautions stipulated in this document and that the facilities have the potential to meet the Ministry standards, guidelines and criteria for mobile PCB destruction facilities. Details of the proposed demonstration testing, the analytical procedures, and of the nature, quantity and flow rate(s) of PCB waste to be tested must be submitted in the request for agreement to demonstrate facilities. The request must contain, but may not be limited to, the following details:

- a) process and design details of bench or pilot scale facilities previously tested, as well as of the proposed commercial scale facility to be tested;
- b) test results of pilot or bench scale facilities previously tested or of commercial facilities operated elsewhere which establish successful destruction of PCBs without generating emissions of any other pollutants at levels which would lead to the Ministry regulations, standards, criteria and guidelines being exceeded. Such results should include PCB content in the materials treated and resulting by-products (gaseous, liquid and solid) from the process;
- c) sampling and analytical methods used to obtain test results;

- d) proposed testing protocol for the demonstration including materials handling procedures; nature and quantity of PCB wastes to be destroyed; duration of proposed tests (time on site and time of actual testing); emission streams to be monitored and sampling and analytical methods; proposed process monitoring and automatic shutdown features; proposed method of calculating overall process material balance; nature and quantity of supplementary fuels and other reaction chemicals, (for example, scrubbing solutions), proposed method(s) of disposal of liquid and/or solid effluents;
- e) expected emissions and point of impingement calculations for anticipated air emissions demonstrating compliance with Regulation 308 and any air criteria and guidelines of the Ministry;
- f) location of proposed demonstration site and site characteristics (See Section 3.3); and
- g) qualifications of staff operating the facilities and supervising the demonstration.

3.2 Operating Requirements for Demonstration Testing

3.2.1 Assembly and Operation of Facilities

The proponent shall demonstrate to the satisfaction of the Director that the facilities are mobile and can be operated in their commercial mode within the time constraints specified in the Regulation.

Prior to the start-up of the testing unit, the system shall be inspected by Ministry staff and operating personnel for the integrity of the various components. All pipe joints, valve and pump glands must be free of leaks and all flexible hoses in good condition.

3.2.2 Operational Controls

During the demonstration period, the facilities shall be operated in accordance with the waste storage and handling, transportation, contingency planning, security and occupational health and safety requirements stipulated in Ontario's PCB Regulations, (Ont.Reg. 11/82 and the one shown in Appendix 1.0) and section 2 of this document.

In addition, facilities must be designed and operated so that fugitive emissions of PCB vapours, spills and accidental PCB releases are minimized and contained. A detailed description of materials handling and control procedures, including equipment design features intended to prevent spills and vapour losses, must be submitted to the Ministry. Designs must take into consideration published Environment Canada and Ministry guidelines and codes of practice such as

- 1) "Handbook on PCBs in Electrical Equipment"
Environmental Protection Service,
Environment Canada, December, 1982; and
- 2) "Origin and Management of PCB Waste,"
Ministry of Environment, April, 1984.

Materials of construction compatible with PCB wastes are to be used. Flanges, joints and couplings in piping arrangements should be minimized. Tank vent and other sources of vapour loss should be vented through activated carbon cartridges or returned to the destruction process in order to control or destroy PCB vapours.

Measures should be taken to exclude precipitation from spill containment areas or, in the alternative, to provide methods of collecting and treating all PCB contaminated precipitation.

No waste may be introduced to the facilities until the operating conditions necessary for the destruction of PCBs have been attained.

3.2.3 Operator Training

The proponent shall submit documentation to the satisfaction of the director that the operators of the mobile PCB destruction facilities have been properly trained to operate the facilities under normal and emergency situations. In particular, operators should be trained in the following areas:

- a) the basic physical and mechanical features of the mobile PCB destruction facilities, for which approval is being sought;
- b) the function and location of the equipment within the facilities including the control panel, and safety features of various control units;

- c) handling guidelines for PCB wastes and any substances used for their treatment such as, for example, caustic soda, oxygen, sodium, nitrogen;
- d) occupational health and safety guidelines for PCB wastes and any substances used for their treatment, including:
 - knowledge of the Occupational Health and Safety Act,
 - safety procedures for handling PCB wastes and substances required for their treatment,
 - knowledge of the function and use of different kinds of safety equipment available in the facility, such as fire extinguishers, protective clothing and respiratory equipment;
- e) environmental concerns related to PCB wastes and substances used for their treatment;
- f) basic physical and chemical knowledge of PCB wastes and substances used for their treatment, including:
 - corrosivity, reactivity, flammability, explosivity and toxicity;
- g) emergency handling procedures for PCB wastes and other substances required in the facilities for which approval is being sought, including:
 - procedures by which spills would be stopped;
 - different containment techniques that would be used;
 - procedures by which fires would be extinguished; and
- h) emergency reporting procedures, including reporting of spills to government agencies as required in the contingency plan to be filed by the owner.

3.2.4 Test Duration

The facilities shall be operated under conditions necessary to destroy PCBs for a period sufficient to obtain the required samples for analysis of waste streams and destruction efficiency.

In the case of continuously operated processes, the facilities may have to be operated for a minimum of 6 to 8 hours under these conditions to obtain one complete set of samples of all streams to be monitored. Collection of 1 such set of samples will be considered one complete test. A minimum of 3 such tests must be carried out to ensure the reliability of the operation and of the analytical results for each different type of PCB waste to be destroyed (e.g. solid, askarel, contaminated oil).

In the case of batch processes, a minimum of 3 batches for each different PCB waste to be treated is required. Sampling may have to be extended over several batches to allow collection of enough material to establish compliance with Ministry requirements. One complete set of samples of all streams to be analyzed must be collected during each batch test.

Under no circumstances will the facilities be permitted to operate (i.e. actively process PCB waste materials) at a site for purposes of demonstration testing for more than 720 hours.

3.2.5 Test Waste Feed Concentrations

The facilities shall be tested at the maximum PCB concentration and feed rate for which approval is being sought.

When the facilities to be tested have neither been operated nor demonstrated previously in another jurisdiction, the Director may also require that a range of concentrations of up to 3 waste feed streams be tested, ranging from PCB free to the maximum concentration of PCB in the waste for which approval to treat is being sought. A minimum of three tests at each concentration would have to be carried out. In such cases, results from testing of lower concentrations of PCB wastes must be approved in writing by the Ministry before the testing of the next higher concentration may begin.

3.2.6 Supplementary Fuel Composition

If supplementary fuel is required for operation of the facility, a detailed chemical analysis shall be submitted with the application. Any material found in the fuel which may result in contaminant emissions must be sampled for during the demonstration and included in the analyses. The use of waste solvent as a supplementary fuel is not permitted.

3.2.7 Discharge of Waste Streams

All liquid and solid products formed during the destruction tests shall be retained until sample analyses have been obtained and the Ministry has authorized discharge or disposal of the products.

3.3 Site Selection for Demonstration Testing

3.3.1 Distance from Receptors

To address public concerns and fire protection needs, a minimum separation distance between facilities to be tested and certain receptors is required. Lands suitable for industrial operations, waste disposal or sewage treatment are recommended for consideration as potential demonstration sites.

For the demonstration tests on Class 1 sites, facilities and associated equipment and storage containers must be located at least 500 meters from occupied public buildings, residences, schools, hospitals, nursing homes, establishments involved in food processing, farm buildings containing livestock, feedlots, and feed processing or handling establishments.

For demonstration testing on Class 2 sites, facilities and associated equipment and storage containers must be at least 100 meters from occupied public buildings, residences, schools, hospitals, nursing homes, establishments involved in food processing, farm buildings containing livestock, feedlots, and feed processing or handling establishments.

For demonstration testing on Class 3 sites, there is no specified separation distance because the PCBs are being handled in a closed loop and there are no significant emissions. The Director will assign appropriate conditions if the situation warrants such action.

After the facilities have successfully demonstrated that they can meet Ministry standards, guidelines and criteria and have received all required approvals, they may then be operated in a commercial mode in accordance with the reduced separation distances specified in the Regulation for Mobile PCB Destruction Facilities. (See Appendix 1.0)

3.3.2 Local Municipal Approvals

The proponent shall obtain all required local municipal approvals. It is recommended that the proponent seek advice on potential sites from local municipal officials such as the municipal engineer and Medical Officer of Health prior to requesting a site approval for demonstration testing from the Ministry.

3.3.3 Public Notification

After receiving authorization for a demonstration from the Ministry, the proponent shall notify in writing the Clerk(s) of the local municipal administration(s) in which the demonstration is to take place. Such notification shall include the time, location and duration of scheduled testing and shall occur at least 30 days prior to commencement of testing.

3.3.4 Site Features

The terrain of the site on which facilities are to be tested shall be level and well graded. Surface materials of sites must allow for prompt and effective clean up of all materials that spill or leak. Prevention of migration of spills into groundwater is of prime importance when considering the suitability of surficial characteristics of potential test sites. In the event that sites do not have these characteristics, alternative measures acceptable to the Director may be used to prevent migration of spills.

For demonstration testing all Class 1 and 2 facilities and associated equipment and storage containers shall be at least 100 meters from a watercourse. These destruction facilities should be isolated from openings to storm or sanitary sewer systems by placement of temporary, impermeable impoundments or barriers.

The required separation distance does not apply to demonstration testing at Class 3 sites, and will not be used if the MOE Regional Director is convinced that a facility at such a site can be physically isolated from a watercourse as well as from sewer systems.

Any potential site which requires site preparation activities that disturb the ground should be verified with a regional archaeologist (named by the Ministry of Citizenship and Culture) to ensure that it is not the site of a cultural, historical or archaeological resource.

3.3.5 Site Preparation and Restoration

The proponent shall be responsible for ensuring that appropriate services, such as electricity and water supply for carrying out the demonstration are available. The proponent shall be responsible for preparation of the site and for site restoration after disassembly of facilities. The site shall be prepared and subsequently restored to the satisfaction of the Ministry.

3.3.6 Performance Bond

Proponents shall post a performance bond of at least \$50,000 (for each Class 1 site or each Class 2 facility) to ensure that funds are available for dealing with spills process upsets and/or site restoration. Where in the Director's opinion it is necessary to have a larger bond posted, a condition will be added to the agreement to carry out the demonstration test. The Ministry or an authorized contractor will inspect the site of the Class 1 demonstration test within 7 days of disassembly and removal of facility and, due to the length of time required for analysis, will report on this inspection within 45 days. If no remedial measures are required, the Ministry will relinquish any claims on the performance bond.

3.4 Monitoring Requirements for Demonstration Testing

Detailed process, emissions, and environmental monitoring will be required during demonstration tests. Results from the detailed emission and process monitoring will be used to establish the conditions, such as the maximum waste feed rate ranges, operating temperatures, etc., within which the facility may be approved to operate.

Operation of facilities after approval by the Ministry, will be controlled using continuous monitoring of process parameters integrated with automatic waste feed and/or process shut down controls.

Any excursions indicating exceedances of the Ministry air pollution guidelines or standards during the test will result in immediate shutdown of testing until the reason for the possible excess emissions has been determined and the problem corrected.

3.4.1 Process Monitoring

Each different destruction technology will have a different set of parameters that are critical to the control of the destruction process and to the prevention of unacceptable environmental emissions. In incineration, for example, such parameters would include but not be limited to, combustion temperature, oxygen concentration, carbon monoxide concentration, carbon dioxide concentration, total hydrocarbon concentration, flow of neutralizing liquid to the scrubber and input feed analysis.

Prior to commencement of testing, the proponent shall submit a process description, complete with critical process parameters that are to be continuously monitored. These parameters, which must be reviewed and approved by the Director prior to commencement of testing, must be continuously monitored in conjunction with emissions to the environment. The ranges of the parameters within which acceptable emissions are achieved are to be established and/or confirmed during testing. Any excursion outside of these ranges shall result in an immediate and automatic shutdown of the waste feed-stream and/or process until the conditions resulting in the process upset have been corrected.

3.4.2 Environmental and Emission Monitoring

The environmental and emissions monitoring requirements are designed to ensure that sufficient data are available to determine significant environmental effects. Provision is made for waiving analyses of certain samples provided certain conditions are met as detailed below.

3.4.2.1 Class 1 Facilities

3.4.2.1.1 PCB Pre-Destruction Background Monitoring

To detect any effect of PCB destruction on the local environment, where applicable, samples of the soil, vegetation, water and ambient air must be collected at the demonstration site and evaluated for PCB and chlorobenzene content. Additional samples must be collected and held for subsequent analyses for polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF), chlorophenols, hydrogen chloride, chloride, sulphur oxides and trace metals and any other substances that

may be deemed necessary by the Director. A list of current recommended sampling methods is set out in Appendix 3.1. An up to date list of references to the recommended sampling procedures is available from the Environmental Approvals and Land Use Planning Branch. Equivalent sampling methodologies to those of the Ministry may be employed subject to prior approval from the director. Table 3.1 summarizes the required pre-destruction background testing.

These are recommended minimum numbers of background samples to be collected. Depending upon the specific technology to be demonstrated and the selected site, additional samples may be required. All background samples must be collected within one week prior to commencement of the PCB destruction demonstration testing.

TABLE 3.1

PCB DESTRUCTION DEMONSTRATION TESTING
PRE-DESTRUCTION BACKGROUND EVALUATION

<u>Sample type</u>	<u>No. of Samples</u>	<u>Sampling Method</u>	<u>Minimum List of Substances to be Analyzed</u>
1A.*Ambient Air	4-one at each compass point, at points of impingement.	Florisil absorption cartridge; continuous analyzers and/or impinger trains.	PCB, chlorobenzenes. HCl & Cl ₂ , NO _x , total hydrocarbon.
1B.Ambient Air	Same as above	Hi-Vol filtration with sorbent cartridge; filter and cartridge to be analyzed separately;	PCDD,PCDF, chlorophenols, SO _x ,
2A.Soil	4-at or near location of ambient air samples	grab samples-take 6 grabs at each location and composite	PCB, chlorobenzenes.
2B.Soil	Same as above	Same as 2A	PCDD, PCDF, chlorophenols, total chlorine, total sulphur, trace metals.
3A.Vegetation	Same as 2A-(only take if location warrants)	grab samples	PCB, chlorobenzenes.
3B.Vegetation	Same as 3A	grab samples	total chlorine, total sulphur, trace metals contents.
4A.Water	4-(take if location warrants)	grab samples	PCB, chlorobenzenes.
4B.Water	Same as 4A	Same as 4A	PCDD, PCDF, chlorophenols, chlorines, trace metals.

* "A" type samples must be taken and analyzed.

"B" type samples must be taken as historical samples - only analyzed if required on the basis of "A" type sample results.

NOTE: Where grab samples are taken, enough sample should be obtained to perform at least 3 determinations for each substance to be tested.

3.4.2.1.2 PCB Destruction Demonstration
Environmental Emission Monitoring

All normal discharges to air, water and soil as well as process streams must be monitored during the PCB destruction demonstration testing. Liquid and solid effluents shall be contained until analytical results demonstrate that they may be safely discharged in compliance with Ministry guidelines and legislation. Specific substances to be monitored will depend upon the specific destruction method being tested. PCBs and chlorobenzenes must always be monitored. Other substances, such as PCDDs, PCDFs, and chlorophenols must also be measured because they may be present in the waste feedstream or may be formed during the PCB destruction process. Table 3.2 is the list of sample streams with corresponding pollutants to be monitored. Emissions should be monitored before and after any pollution abatement equipment, e.g. a scrubber or activated carbon filter, which may be installed downstream of the actual destruction process equipment. Additions or deletions of sample types/numbers may be required, and identified by the Director depending upon the specific PCB destruction technology and location of the demonstration site.

TABLE 3.2

SAMPLES ANALYZED DURING PCB DESTRUCTION TESTING

<u>Sample Type</u>	<u>No. of Samples Required</u>	<u>Sampling Method</u>	<u>Minimum list of Substances to be Analyzed</u>
1. Feed	Take 1 sample at 1/2 hour interval during sampling period combine to give composite sample over the sampling period. For analyses one sample per demonstration test. 3 tests to be carried out.	Grab sample	PCB, chlorobenzenes, trace metals, chlorine and sulphur content, PCDD, PCDF, Chlorophenols, carbon content
2. Water Influent	Same as 1	Same as 1	PCB, chlorobenzenes
3. Supplemental Fuel	Same as 1	Same as 1	PCB, chlorobenzenes, trace metals, chlorine and sulphur contents, PCDD, PCDF, chlorophenols
4. Reagents for Batch Process	Same as 1	Same as 1	PCB, chlorobenzenes, trace metals, chlorine and sulphur contents, PCDD, PCDF, chlorophenols

TABLE 3.2
(Continued)

SAMPLES ANALYZED DURING PCB DESTRUCTION TESTING

<u>Sample Type</u>	<u>No. of Samples Required</u>	<u>Sampling Method</u>	<u>Minimum list of Substances to be Analyzed</u>
5a. Stack Emissions	Two samples per test, three tests per PCB waste concentration	Method 5 train, modified to include two florisil traps. Particulate catch and vapor components (impingers & florisil) to be analyzed separately	PCB, chlorobenzenes, chlorophenols
5b. Stack Emissions	Same as 5a	Same as 5a - separate train required	PCDD, PCDF
5c. Stack Emissions	One sample per test, 3 tests per waste PCB concentration	Method 5 train with 5% HNO ₃ , as impinger solution	Particulates, trace metals
5d. Stack Emissions	As per 5c	Method 5 train, Texas method	HCl, Cl ₂
5e. Stack Emissions	Continuous monitoring	Continuous analyzers	THC, O ₂ , CO, CO ₂ NO _x , SO ₂
6. Liquid Effluent	Same as 1	Same as 1; particulates in water to be filtered and analyzed separately	PCB, chlorobenzenes, total chlorine, total sulphates, PCDD, PCDF, chlorophenols, trace metals, pH & chlorides

TABLE 3.2
(Continued)

<u>Sample Type</u>	<u>No. of Samples Required</u>	<u>Sampling Method</u>	<u>Minimum List of Substances to be Analyzed</u>
7. Ash/Sludge Residue	One sample per 1/2 hour, composited over test period, one sample per test, 3 tests	Composite grab sample from different locations as appropriate	PCB, chlorobenzenes, chlorophenols, trace metals*, total chlorine, total sulphur, PCDD, PCDF
8a. Ambient Air Monitor	8-four in same locations as during pre-test, at points of impingement-four at property line locations	Florisil adsorption cartridge, Hi-Vol filters and impinger trains	PCB, chlorobenzenes, trace metals*, HCl, Cl ₂ , PCDD, PCDF, chlorophenols
8b. Ambient Air Continuous Monitor	Continuous during test: locations depend upon wind direction	TAGA **	PCB

*NOTE: Monitoring of trace metals, sulphur oxides and sulphur contents are requirements only if present in feed and/or supplemental fuel and/or reagents.

Where grab samples are taken, enough sample should be obtained if possible, to perform at least 3 determinations for each substance to be tested.

** TAGA = Trace Atmospheric Gas Analyzer to be made available by the Ministry under certain conditions.

3.4.2.1.3 Replications

Three replicate tests must be conducted at each of the feed rates and PCB waste concentrations to be tested.

3.4.2.1.4 Monitoring for Process Shutdown

A destruction demonstration shall be terminated if ambient levels of 450 ng/m³ of PCB per 1/2 hour average or greater are detected.

Testing will also be terminated if specified destruction process parameters cannot be maintained within specified ranges. Definitions of excessive fluctuations in process parameters will depend upon specific technologies. These definitions will be conditions of the authorization to carry out the demonstration testing.

3.4.2.1.5 Post-Test Monitoring

This consists of the same samples described in Table 3.1, for pretest monitoring and must be taken within 48 hours after the completion of a destruction demonstration. Analysis of post-test soil samples for PCB, chlorobenzenes, and total chlorine must be performed. Analysis of other samples listed in Table 3.1 depends upon results of the destruction demonstration monitoring.

3.4.2.1.6 Analytical Methods

A list of references of the recommended analytical procedures for the various samples collected in Tables 3.1 and 3.2 is shown in Appendix 3.2. Modifications to these procedures or equivalent techniques may be used, only with prior approval from the Ministry of Environment. Complete documentation of methods and modifications must be submitted with the final report (see Section 3.5).

3.4.2.2 Class 2 Facilities

3.4.2.2.1 PCB Pre-Destruction Background Evaluation

The same procedure shall be followed as outlined in Section 3.4.2.1.1, except that analyses for hydrogen chloride, chlorine, sulphur and nitrogen oxides are not mandatory.

3.4.2.2.2 PCB Destruction Demonstration Environmental and Emission Monitoring

All normal emissions to air, water and soil must be monitored. Liquid and solid products shall be contained for discharge until analytical results demonstrate that disposal can be carried out in compliance with Ministry guidelines and legislation as contained in the Environmental Protection Act, the requirements stipulated in Chapter 8, the Ontario Water Resources Act and the Ministry's "Water Management Goals, Policies, Objectives and Implementation Procedures." The sampling and analytical methods shall be as specified in Section 3.4.2.1.1. The sample collection methods will depend upon the design flow and potential quantity and nature of emissions and details of the methods to be used will be provided to the Ministry of the Environment.

Depending on the technologies employed, the Trace Atmospheric Gas Analyzer (TAGA) may not be required for Class 2 technologies. For samples of ambient air, the methods outlined in Table 3.1, 1A and 1B are to be followed.

3.4.2.2.3 Replications

See Section 3.4.2.1.3.

3.4.2.2.4 Post-Test Monitoring

See 3.4.2.1.5, except that analyses for hydrogen chloride, chlorine, sulphur and nitrogen oxides are not required.

3.4.2.2.5 Analytical Methods

See Section 3.4.2.1.6.

3.5 Report Requirements from Demonstration Testing

A report documenting the quantity and nature of wastes tested, amounts and quality of the liquid and solid wastes generated and disposal procedures, testing procedures, analytical methods and results for predestruction, demonstration and post-test monitoring shall be submitted to the Ministry. Complete documentation of methods and modifications must be submitted. It is essential to demonstrate, using a material balance of incoming and exit streams that the PCBs are actually being destroyed in the test facilities, without creation of other pollutants that exceed existing Ministry standards and guidelines.

The report shall address, as a minimum, the subjects indicated in the following headings:

Objectives

Process Description

- facility design details

Methods

- sample collection procedures
- numbers of samples collected
- analytical procedures
- detection limits
- duration of test periods
- nature and quantity of wastes treated

Results

- process monitoring
- environmental monitoring
- emissions monitoring
- material balance of incoming and exit streams
- comparison of results with regulatory standards

Conditions For Which Approval Is Sought

- waste flow rates and PCB concentrations
- process parameter shutdown conditions

3.6 Conclusions from Demonstration Testing

Responsibilities

The proponent shall be responsible for:

- (i) all expenses incurred in preparing applications for approval of demonstration testing and for approval of facilities;
- (ii) site preparation and site restoration;
- (iii) location and operation of facilities at demonstration site;
- (iv) all process and emission monitoring;
- (v) analysis of process and emission tests;
- (vi) testing and disposal of all aqueous and solid wastes;
- (vii) preparation of final report; and
- (viii) obtaining all local municipal approvals.

To facilitate the implementation of mobile PCB destruction facilities in Ontario, the Ministry will:

- (i) consider assuming the responsibility for collection and analysis of ambient environmental monitoring samples until a number of such facilities have been successfully established;
- (ii) be present when facilities are being tested (for all periods of operation for Class I facilities);
- (iii) witness testing procedures; and
- (iv) authorize the senior Ministry official present at the demonstration site to order shutdown of testing as a condition of Ministry agreement to conduct the demonstration.

APPENDIX 1.0

REGULATION MADE UNDER THE
ENVIRONMENTAL PROTECTION ACT

MOBILE PCB DESTRUCTION FACILITIES

1. In this Regulation,

"PCB" means any monochlorinated or polychlorinated biphenyl or any mixture of them or mixture that contains one or more of them;

"PCB equipment" means equipment designed or manufactured to operate with PCB liquid or to which PCB liquid was added or drums and other containers used for the storage of PCB liquid;

"PCB liquid" means liquid containing PCBs at a concentration of more than fifty milligrams per kilogram;

"PCB material" means material containing PCBs at a concentration of more than fifty milligrams per kilogram whether the material is liquid or not;

"PCB waste" means,

(a) PCB equipment,

(b) PCB liquid, or

(c) PCB material,

but does not include,

(d) PCB material or PCB equipment after it has been decontaminated pursuant to guidelines or codes of practice published by the Ministry of the Environment,

(e) PCB equipment that is,

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- (i) an electrical capacitor that has never contained over one kilogram of PCBs,
 - (ii) electrical, heat transfer or hydraulic equipment or a vapour diffusion pump that is being put to the use for which it was originally designed or is being stored for such use by a person who uses the equipment for the purpose for which it was originally designed, or
 - (iii) machinery or equipment referred to in subclause (f)(i), or
- (f) PCB liquid that is,
- (i) at the site of fixed machinery or equipment, the operation of which is intended to destroy the chemical structure of PCBs by using the PCBs as a source of fuel or chlorine for a purpose other than the destruction of PCBs or other wastes and with respect to which a certificate of approval has been issued under section 8 of the Act specifying the manner in which PCB liquid be processed in the machinery or equipment, or
 - (ii) in PCB equipment referred to in subclause (e)(ii).

"mobile PCB destruction facility" means movable, transportable machinery or equipment that is intended to destroy the chemical structure of PCBs;

"local municipality" means a city, town, village, township or improvement district.

2.-(1) Mobile PCB destruction facilities that process PCB waste so that the PCB and associated organic matrix are disposed of by incineration or other thermo-chemical processes are classified as Class 1 mobile PCB destruction facility waste management systems.

(2) Mobile PCB destruction facilities that process PCB waste so that the PCB is disposed of by chemical means and the

associated organic matrix is recovered for re-use or disposal are classified as Class 2 mobile PCB destruction facility waste management systems.

(3) Every site upon which a Class 1 mobile PCB destruction facility waste management system is situate to operate solely to destroy PCB waste is classified as a Class 1 mobile PCB destruction facility waste disposal site.

(4) Every site, except a Class 3 mobile PCB destruction facility waste disposal site, upon which a Class 2 mobile PCB destruction facility waste management system is situate to operate solely to destroy PCB waste is classified as a Class 2 mobile PCB destruction facility waste disposal site.

(5) Every site upon which is situated a Class 2 mobile PCB destruction facility waste management system that is connected to an electrical transformer for which the transformer fluid is treated and returned to that transformer is classified as a Class 3 mobile PCB destruction facility waste disposal site.

3.-(1) Class 2 mobile PCB destruction facility waste management systems and Classes 2 and 3 mobile PCB destruction facility waste disposal sites are exempt from the provision of section 32 of the Act whereby a public hearing may be required.

(2) Classes 2 and 3 mobile PCB destruction facility waste disposal sites are exempt from the provision of section 30 of the Act requiring a public hearing.

(3) All classes of mobile PCB destruction facility waste disposal sites are exempt from section 45 of the Act.

4.-(1) Every operator of a mobile PCB destruction facility waste disposal site shall keep the following records in respect of the site:

1. A description of the source, nature and quantities of the PCB wastes dealt with.
2. The name of the owner of the site and the name of the operator of the site.
3. A description of the location of the site where the PCB wastes are being destroyed including, if that site is one authorized under Ontario Regulation 11/82, the name of the operator of that PCB waste disposal site.
4. The dates of receipt and destruction of the PCB wastes received.
5. The method of destruction used for disposal of the PCB waste and the time of commencement and cessation of each of the operations of the equipment used for each day or part day of operations.
6. Where monitoring or sampling equipment is employed, the resulting monitoring or sampling and analytical information and, where instructed by the Director in writing, a summary of the resulting monitoring or sampling and analytical information.
7. A description of the nature and quantities of any solid or liquid material remaining after destruction of PCB waste.
8. The methods, times and locations at which any material referred to in paragraph 7 is disposed of or stored.
9. A description of every accident, process upset, breakdown or spill that occurs at the site including the reasons for the occurrence, any damage or injury suffered and the measures taken to repair, mitigate or prevent damage or injury.

(2) Every operator of a mobile PCB destruction facility waste disposal site shall submit to the Director a written

report containing the information required to be recorded under subsection (1) and paragraph 17 of section 6 within sixty days after the cessation of operations at the site.

(3) An operator may dispose of records kept under subsection (1) and paragraph 17 of section 6 five years after the submission of the report referred to in subsection (2).

5.-(1) No Class 2 mobile PCB destruction facility waste management system shall remain on a Class 2 or 3 mobile PCB destruction facility waste disposal site for more than ninety days after the start of its installation or assembly at the site.

(2) No Class 2 mobile PCB destruction facility waste management systems shall be operated,

(a) at Class 2 mobile PCB destruction facility waste disposal sites during the first year that they are located in a particular local municipality, where the operations would result in an aggregate, for the year, of more than a total of up to 1800 hours; or

(b) except as permitted in clause (a), for more than a total of up to 1440 hours without a break of at least one year before the next operation totalling up to 1440 hours.

(3) No mobile PCB destruction facility shall be operated at any one Class 3 mobile PCB destruction facility waste disposal site for more than a total of up to 168 hours without a break of at least one year before the next operation totalling up to 168 hours may begin.

(4) Subsections (1), (2) and (3) do not apply where prior approval for a longer established site period or a longer

operating period is granted by the Director, the municipal government responsible for waste disposal and the local municipality in which the site is located.

6.-(1) The following are prescribed as standards for the location, maintenance and operation of mobile PCB destruction facility waste disposal sites:

1. The maximum one half hour average concentration of PCB in air at a point of impingement from a mobile PCB destruction facility waste disposal site shall not be greater than 450 nanograms per cubic metre of air.
2. The maximum one half hour average concentrations of chlorinated dibenzodioxins and chlorinated dibenzofurans in air at a point of impingement from a mobile PCB destruction facility waste disposal site shall be such that the following calculation results in a value of A less than or equal to one:

$$\frac{X}{450 \text{ pg}/\text{m}^3} + \frac{Y}{450 \times 50 \text{ pg}/\text{m}^3} = A$$

where x = one half hour concentration, in pg/m^3 , of chlorinated dibenzodioxin determined at a point of impingement

y = one half hour concentration, in pg/m^3 , of chlorinated dibenzofuran determined at a point of impingement

pg/m^3 = picograms per cubic meter.

3. The one half hour average concentrations of PCB, chlorinated dibenzodioxins and dibenzofurans in air at a point of impingement shall be determined by measurement of the air or by calculation in accordance with the Appendix to Ontario Regulation 308 of the Revised Regulations of Ontario, 1980 except, where the calculation is used, the maximum height above grade of the point of emission, for purposes of the calculation, shall be 12.2 metres.

4. For Class 1 systems, the mass air emissions from the system shall be no greater than 0.001 grams PCB per kilogram of the PCB introduced into the system.
5. Solid waste that originates from the operation of a mobile PCB destruction facility waste disposal site shall be dealt with as follows:
 - i. Where the waste contains a concentration of fifty milligrams per kilogram or less of PCB, the waste shall be disposed of in a properly certified waste disposal site.
 - ii. Waste that contains a concentration exceeding fifty milligrams per kilogram of PCB shall not be diluted.
 - iii. Where the waste contains a concentration exceeding fifty milligrams per kilogram of PCB, Ontario Regulation 11/82 applies to its storage, transportation and disposal.
6. PCB equipment shall not be decontaminated at a mobile PCB destruction facility waste disposal site unless the certificate of approval for the site expressly allows the activity.
7. Cooling water, surface drainage water, including contaminated precipitation, and other wastewater that originates from the operation of a mobile PCB destruction facility waste disposal site shall be dealt with as follows:
 - i. Where the wastewater contains a concentration of up to five micrograms per litre of PCB, it may be discharged,
 - A. to a municipal sewage treatment plant,
 1. if the certificate of approval of the site expressly allows the activity and specifies the municipal sewage treatment plants that may receive the discharge, or
 2. in accordance with written instructions of the Director,
 - B. except as prohibited in subsection (2), by spraying it on soil,

1. if the certificate of approval of the site expressly allows the activity, or
 2. in accordance with written instructions of the Director,
 - C. directly or indirectly into water,
 1. if the certificate of approval of the site expressly allows the activity, or
 2. in accordance with written instructions of the Director.
 - ii. Where the wastewater contains a concentration of five micrograms per litre or greater of PCB, it shall be treated, through removal or destruction of the PCB, to reduce the PCB concentration to less than five micrograms per litre and discharged as provided in subparagraph i.
 - iii. Wastewater containing tetrachlorinated to octachlorinated dibenzodioxins or tetrachlorinated to octachlorinated dibenzofurans shall not be discharged, directly or indirectly, into water unless the concentration of these materials in the wastewater ultimately discharged to the natural environment is equal to or less than 0.25 nanograms per litre for each congener group of these chemicals based on a one litre sample size.
8. Every person storing PCB waste at a mobile PCB destruction facility waste disposal site shall ensure that the PCB waste is in a safe and secure location so as to prevent PCB waste coming into contact with any person and so that all liquid containing PCBs that may escape can be readily recovered and will not discharge, directly or indirectly, into a watercourse or groundwater.
 9. All PCB liquid that is spilled shall be safely and effectively contained forthwith and the liquid and all associated contaminated materials shall be placed in closed containment.
 10. Except as provided in subsection (3), each mobile PCB destruction facility waste disposal

site shall have an assigned storage area where all PCB wastes awaiting treatment, decontamination or destruction are contained.

11. The storage area referred to in paragraph 10 shall be contained by a spill collection tray system or an impoundment on an impermeable pad or floor of sufficient capacity to contain 100 per cent of the volume of the stored liquid or such lesser amount, consistent with maintaining the protection of human health and the natural environment, as the Director stipulates as a condition attaching to the site certificate of approval.
12. Precipitation shall be either excluded from spill containment areas or collected and sampled and that which is contaminated with PCBs dealt with in accordance with paragraph 7.
13. For Class 1 and 2 sites, the volume of PCB wastes contained in the storage area referred to in paragraph 10 shall not exceed the volume required for 120 hours of operation or such greater amount as the Director, after considering the capacity of the system, the type of storage, the site location and the contingency plans and spill containment features for the site, permits as a condition attaching to the site certificate of approval.
14. Drums and storage tanks used to store PCB waste shall be of good quality, free from corrosion and visible defects, sealed and clearly identified as containing PCB waste.
15. When a transfer of PCB liquid from one container to another is necessary, the PCB liquid shall be pumped whenever practical.
16. Mobile PCB destruction machinery including pumps, hoses, connections and other equipment used to handle PCB waste shall be thoroughly inspected for leaks and signs of wear during each start-up and shut-down of operation of the equipment and at least once during every continuous eight hour period of operation of the equipment.
17. The operator of the facility shall keep records of the inspections carried out in accordance with paragraph 16 and shall include the following:

- i. The time and date of the inspection.
 - ii. The name and job title of the person carrying out the inspection.
 - iii. A description of the equipment inspected.
 - iv. The reason for the inspection.
 - v. The observations made.
 - vi. Any tests carried out and the results of the tests.
 - vii. A description of all equipment replaced and repairs and maintenance carried out as a result of every inspection.
 - viii. The signature of the person making the inspection verifying that the information is correct.
18. Pumps, hoses, connectors and other equipment used to handle PCB waste shall not be used for any other purpose unless they have been decontaminated, prior to any other use being made of them.
 19. Class 1 and 2 sites shall be enclosed to prevent entry by unauthorized persons and access to the property shall be controlled by a gate capable of being locked.
 20. All operations at the site shall be adequately and continually supervised.
 21. Access to the site shall be limited to the times an attendant is on duty.
 22. Except as provided in subsection (4), where a location is to be used as a Class 1 site, the facility and associated equipment, including PCB waste storage containers shall be at least 250 metres from occupied residences, public buildings, schools, hospitals, nursing homes, commercial or industrial food processing or preparation establishments, farm buildings containing livestock, feedlots and livestock feed processing or handling establishments.
 23. Except as provided in subsection (4), where a location is to be used as a Class 2 site the facility and associated equipment, including PCB

- waste storage containers, shall be at least twenty metres from occupied residences, public buildings, schools, hospitals, nursing homes, commercial or industrial food processing or preparation establishments, farm buildings containing livestock, feedlots and livestock feed processing or handling establishments.
24. No systems and associated equipment, including PCB waste storage containers, shall be located,
- i. closer than 100 metres from any watercourse, except that equipment at a Class 3 site may be closer if the equipment can be adequately isolated from the watercourse using impermeable impoundments or barriers, and
 - ii. closer than 100 metres from any drainage system, including openings to sanitary and storm sewer systems, except that equipment may be closer if the equipment can be adequately isolated from the drainage system using impermeable impoundments or barriers.
25. The terrain of a site on which the mobile PCB destruction facility is to be established shall be reasonably level and well graded.
26. Soil or ground cover characteristics shall be such as to facilitate prompt containment and clean-up of all spills of liquid containing PCBs.
27. Where parameters have been identified and operational ranges established as conditions attaching to a certificate of approval for control of a mobile PCB destruction facility was a management system, the input of PCB waste to the destruction unit of the system shall cease forthwith upon the operational range for any of the identified parameters being exceeded.

(2) Sub-subparagraph B of subparagraph i of paragraph 7 of subsection (1) does not apply to permit spraying in residential, school or public parkland areas or where the total spray volume at the soil spray site would result in a

concentration of PCB of greater than 5 milligrams per kilogram in the soil layer located from the surface of the ground to a depth of 15 centimetres below ground surface.

(3) Paragraph 10 of subsection (1) does not apply to any mobile PCB destruction facility located at an existing PCB waste disposal site established under Ontario Regulation 11/82 or a certificate of approval specifying the manner in which PCB waste may be stored.

(4) For the purposes of paragraphs 22 and 23 of subsection (1), commercial or industrial food processing or preparation establishments do not include food processing or preparation facilities associated with lunchrooms, cafeterias or similar establishments controlled by the owner or operator of the site mainly for the use by employees of the owner or operator.

7.-(1) An application for a certificate of approval for a mobile PCB destruction facility waste management system or waste disposal site shall be in Form 1 and shall include,

- (a) a contingency plan that sets out the measures that will be taken by the operator to deal immediately with on-site emergencies such as spills, fires and vandalism and,
 - (i) the notification procedures to be used to contact the Ministry and municipal authorities forthwith, of the emergency being encountered as well as the measures being taken to deal with it, and
 - (ii) a list of the equipment, material and personnel that will be available at the site or will be called to the site to deal with an emergency and a description of methods and procedures to be employed in dealing with an emergency; and

- (b) a data quality assurance program showing,
 - (i) protocols for testing and operating the facility,
 - (ii) the capabilities of the laboratory facilities to be used,
 - (iii) a statement of the credentials, training and experience of the operating staff including supervisory and laboratory staff, and
 - (iv) a description of the monitoring and analytical programs, in the workplace and elsewhere, to be carried out.

(2) Every operator of a site shall ensure that the equipment and material, as set out in a contingency plan, for an approved site is kept on hand, adequately maintained and kept in good repair for immediate use and that site personnel are trained in its use and the methods and procedures to be employed in the event of an emergency.

8.-(1) Every applicant, other than a municipality, for a certificate of approval for a Class 1 mobile PCB destruction facility waste disposal site shall,

- (a) deposit a sum of money;
- (b) furnish a surety bond; or
- (c) furnish personal sureties,

in the amount of \$50,000.

(2) Every applicant, other than a municipality, for a certificate of approval for a Class 2 mobile PCB destruction facility waste management system shall,

- (a) deposit a sum of money;
- (b) furnish a surety bond; or

(c) furnish personal sureties, in the amount of \$50,000 for each mobile PCB destruction facility operating in Ontario.

(3) Where the applicant, during operation of the site or within sixty days after giving the Director notice that the equipment is disassembled and the site is terminated, fails to comply with the Director's requirements to remove such waste or to carry out such actions as the Director considers necessary to ensure satisfactory maintenance of the equipment or the site, the money, bond or sureties deposited or their proceeds may be used by the Director in carrying out the necessary actions.

9.-(1) Where notice is required to be given under subsection 30(2) of the Act in respect of a proposed Class 1 site, notice shall also be given to the clerk of the municipality responsible for waste disposal, the medical officer of health, the directors of the local Boards of Education and, where the proposed site is part of an existing industrial establishment, mine or mining plant, a copy of the notice shall be posted in a conspicuous place at the work place where it is likely to come to the attention of the workers.

(2) For the purposes of subsection (1), "industrial establishment", "mine", "mining plant" and "work place" have the same meaning as in the Occupational Health and Safety Act.

(3) The notice required under subsection (1) shall include,

- (a) the date on which assembly of the Class 1 system and PCB wastes may commence;
- (b) location of the site;
- (c) estimated amount and PCB concentration of the waste to be treated;
- (d) estimated duration of operations at the site;
- (e) estimated schedule of operations at the site;
- (f) a brief description of the technology; and
- (g) the location of a public repository holding all documents associated with the application for Class 1 site approval.

(4) For Class 2 sites, thirty days' notice of an application for the issuance of a certificate of approval shall be given to the clerks of the local municipality and the municipality responsible for waste disposal if it is not the local municipality and the medical officer of health.

(5) The notice required under subsection (4) shall include,

- (a) the date on which assembly of the Class 2 system and PCB wastes may commence;
- (b) location of the site;
- (c) estimated amount and PCB concentration of the waste to be treated;
- (d) estimated duration of operations at the site;
- (e) estimated schedule of operations at the site;
- (f) a brief description of the technology; and
- (g) the location of a public repository holding all documents associated with the application for site approval.

10.-(1) Where the fluid from an electrical transformer is treated at a Class 3 site, the fluid shall be sampled and analyzed for PCBs no sooner than 90 days after the completion of the treatment.

(2) For the purposes of this Regulation, the PCB equipment referred to in subsection (1) shall not be considered to be decontaminated until the sample results required under subsection (1) confirm that the PCB concentration of the fluid is less than 50 milligrams per litre.

11. The PCB waste to be destroyed in a mobile PCB destruction facility waste management system shall be sampled and analyzed for PCBs, in a manner that will ensure that the amount or concentration of PCB in the feedstock is in compliance with the approved capacity of the system.

12. Solid and liquid wastes from the operation of a Class 2 or 3 mobile PCB destruction facility waste disposal site that may contain PCBs shall be sampled and analyzed for PCBs prior to disposal.

13. For Class 1 systems, the mass air emissions from the system shall be sampled for PCBs, chlorinated dibenzodioxins and chlorinated dibenzofurans as set out in each of the following paragraphs, with analysis of the samples to be completed as soon as practicable following sampling completion:

1. During the first 24 hours of operation at each of the first three sites of operation.
2. At least once, in addition to the requirement under paragraph 1, for each of the first three sites of operation and, thereafter, at least

once in every year in which the system is in operation in Ontario.

3. After any major repairs or alterations to the system that are likely to affect the mass air emissions of these chemicals.

14. Where any class of mobile PCB destruction facility waste disposal site is to be located on land that is the subject of a certificate of approval issued pursuant to Part V of the Act for other than a mobile PCB destruction facility waste disposal site, the existing waste management system or waste disposal site is exempt from the application of sections 27, 30 and 32 of the Act with respect to the use, operation, establishment, alteration, enlargement or extension of the mobile PCB destruction facility waste disposal site where a separate certificate of approval is issued for the mobile PCB destruction facility waste disposal site.

Form 1

Environmental Protection Act

APPLICATION FOR A CERTIFICATE OF APPROVAL FOR
DESTRUCTION OF PCBs USING MOBILE TECHNOLOGY

- NOTE: (1) The Applicant is encouraged to seek assistance in filling out this Application Form by reference to the most current Ministry of Environment Publication entitled, "Details Document, Mobile PCB Destruction Facilities".
- (2) The Applicant should ensure that the documentation provided with this application addresses the requirements set out in the regulation to clearly show how they are complied with during operation.
- (3) The Applicant should specifically indicate, by attachment, those sections of, (a) the supporting documents, (b) various attachments, and (c) this application, if any, that the Applicant wishes the Director to treat as confidential, giving reasons why each item should be so treated. The application and supporting information will form part of the local information repository for all site applications save that considered by the Director, in consultation with the Applicant, to be properly classified as confidential.

1. Approval is being sought for: (Check ())

- (a) Mobile PCB Destruction Facility Waste Management System (Technology) ()
- (b) Mobile PCB Destruction Facility Waste Disposal Site (Site) ()

2. Applicant:

- (a) Name:
- Address:
-
- City/Town Province/State Postal/Zip Code

(b) Contact Person for this Application:

Name:

Position With Applicant:

Telephone:

(c) Every applicant other than an individual operating under his or her own name must attach a copy of:

(i) the most current "Initial Notice or Notice of Change", (Form 1 or 2 of O. Reg. 189 R.R.O., 1980) filed under the Corporations Information Act, or

(ii) the most recent declaration filed under the Partnerships Registration Act.

(d) If more than one applicant, supply the above information for each applicant.

3. (a) Does Applicant own the destruction technology equipment?

Yes/No

(b) If not, supply the following information:

(i) Equipment Owner's Name:

Address:

.....
City/Town Province/State Postal/Zip Code

(ii) By attachment, the details of the relationship between the equipment owner and Applicant with respect to liability for any occurrences arising out of the transportation, assembly, use and disassembly of the equipment.

TECHNOLOGY

4. The following information is required for the technology associated with this application:

(a) If the technology is currently approved by the Ontario Ministry of the Environment, provide the date and Certificate of Approval Number for the approval.

Date:

Approval No.:

The relevant documentation from this approval will form part of the local information repository for all site applications using this approved technology. Any matters considered confidential must be specifically identified by the applicant with reasons given as to why the information must be kept confidential.

(b) Where approval of the technology is required:

(i) Class of System: Class 1 ()
Class 2 ()

(ii) Type of Operation:

Continuous ()
Batch ()
Other ()
(If other, specify)

(iii) Type of PCB Wastes to be disposed of:

Liquid () Solid ()

Describe the wastes: (use attachment if necessary)

.....
.....
.....
.....

(iv) Range of PCB concentrations to be dealt with for each waste type: (include units) (use attachment if necessary)

	<u>Type</u>	<u>From</u>	<u>To Maximum</u>
1.
2.
3.

(v) Maximum volume/weight and related maximum PCB concentration of each waste type to be treated in an appropriate time period: (include units) (use attachment if necessary)

	<u>Type</u>	<u>Vol./Wt.</u>	<u>Concentration</u>	<u>Time Period</u>
1.
2.
3.

(vi) Supplementary fuel requirements:

Type of fuel:

Storage capacity on mobile unit:

Type and capacity of storage required at site, not on the unit:

Flow Rate:

If more than one fuel supplement, include further information as attachment.

(vii) Storage capacity for PCB wastes as part of the mobile unit:

Liquids: litres Solids:cu.m.

NOTE: Documentation on how accidental discharges of any materials from the mobile unit will be contained and cleaned up must be included in design, operations and/or contingency plans or manuals submitted as part of this application.

(viii) Attach a list of solid and liquid waste types, composition, volumes per unit time and sources generally generated by operation of the mobile unit. A detailed description of this information shall be included in the process description and mass balance documentation to be attached. This information shall be supplemented on a site application to deal specifically with the wastes being disposed of at the site.

(ix) Attach a list of air contaminants generally expected to be emitted from the mobile unit including the concentrations for each contaminant and air flow data for each source. This information shall be supplemented on a site application to deal specifically with the wastes being disposed of at the site.

(x) Attach a list of process parameters which are able to be monitored and the operational range for each parameter for acceptable operation. A detailed description of these parameters and the methods of monitoring along with reasons for choosing the appropriate operational range for each shall be included in the design and/or operations documentation.

- (xi) Briefly describe conditions which would result in automatic shutdown of the destruction process.

.....
.....
.....

Refer to location(s) in supporting documentation where shutdown features are dealt with in detail.

.....

- (xii) For Class 2 systems, indicate the type of financial security to be provided:

Cash ()

Surety Bond ()

Personal sureties ()

Attached details of how this security is arranged.

- (xiii) Supporting documents attached:

Process Description ()
(Physical/chemical/biological)

Mass Balance Calculations ()

Design Plans ()

Design Manual ()

Operations Manual ()

Contingency Plan ()

Data Quality Assurance Program ()

Other (attach title list) ()

SITE

5. The following information is required for each site associated with this application:

(a) Class of Site:

Class 1 () Class 2 () Class 3 ()

NOTE: A hearing is required to be held on applications for Class 1 sites.

(b) Site Location:

Description:
Street Address or Lot and Concession

Municipality:
City, Town, Village, Township or
Improvement District

.....
Metropolitan Area, Region, County or
District

NOTE: Site plans attached under paragraph 5(n) shall precisely depict the site location and its relationship to features noted in the regulation.

(c) Site Owner(s):

Name(s):

Address:
Street

.....
City/Town Province/State Postal/Zip Code

If a site is occupied or under the charge, management or control of someone other than the owner, the above information for that person(s) is required, by attachment.

- (d) Attach a complete summary of the PCB wastes that are intended to be disposed of at the site from all sources. This summary must include:

- (i) the present owner of the waste,
- (ii) the source of the waste,
- (iii) the present location of the waste,
- (iv) the person presently in possession or control of the waste if not the owner,

- (v) the type of waste (i.e. solid, liquid) and description,
- (vi) the volume of waste (in litres and/or cubic metres),
- (vii) the maximum concentration of PCBs and the range, where applicable, and,
- (viii) how it will be dealt with prior to destruction.

Note: Where it is not obvious what other materials the PCB wastes may contain, the Director requires confirmation of materials composition by sample analysis.

(e) State:

- (i) The total capacity of the storage area associated with this site:

liquids litres solids kg.

- (ii) Is this site presently approved pursuant to a certificate of approval or O. Reg. 11/82?

.....
Yes/No

If yes, provide the date of approval and either the Certificate of Approval Number or a copy of the Director's Instructions under O. Reg. 11/82.

Date:

Approval No.: or Director's Instructions attached ()

- (f) Refer to location(s) in supporting documentation where on site storage facilities, including containment and weather protection, are dealt with in detail.

.....
.....

(g) Indicate:

- (i) what days of the week and hours of operation are being sought for approval:

DAY	HOURS OF OPERATION	TOTAL HOURS PER DAY
Sun.		
Mon.		
Tue.		
Wed.		
Thurs.		
Fri.		
Sat.		

Total Hours Per Week: = _____

- (ii) number of weeks of operation for which approval is sought: weeks.
- (iii) total hours of operation to be covered by the approval if given:
.....

(h) Indicate:

- (i) estimated date for commencement of assembly of the technology:
.....
- (ii) time required for assembly of technology:
.....
- (iii) time required for disassembly of technology and quitting site:
.....
- (iv) estimated expiry date for this approval if given:
.....

- (i) Do you wish to decontaminate PCB equipment at this site under this application?
Yes/No

If yes, attach documentation detailing what equipment is to be decontaminated, the methods to be used, and the additional PCB wastes to be generated. Include this volume in paragraph 5(d) above.

- (j) Attach a list of solid and liquid waste types, composition, volumes and sources expected to be generated by the operation of this site. A detailed description of this information shall be included in the operations manual documentation to be attached.

- (k) Describe where and how the wastes identified in paragraph 5(j) are to be disposed of: (include attachment if necessary)

.....
.....
.....

Note: Wastes must be classified in accordance with Regulation 309, R.R.O., 1980 and disposed of at waste disposal sites or sewage treatment plants certified to accept waste of that type or under this certificate of approval.

- (l) Attach a list of air contaminants expected to be emitted by the operation of this site including the concentrations for each contaminant and each source. Include the necessary calculations to show air emission compliance with this regulation and Regulation 308, R.R.O., 1980.

Note: An application for a certificate of approval pursuant to section 8 of the Environmental Protection Act must be made and approved where air emissions are expected. The section 8 application can be made jointly with this application on the appropriate form obtained from the Director.

- (m) For Class 1 sites, indicate the type of financial security to be provided:

Cash	()
Surety Bond	()
Personal sureties	()

Attach details of how this security is arranged.

- (n) Supporting documents attached for this site:

Site Plans	()
Operations Manual	()
Contingency Plan	()
Data Quality Assurance Program	()
Other (attach title list)	()

(o) Attach copies of letters of transmittal confirming that the contingency plan has been filed with the clerks of the local municipality and the municipality responsible for waste disposal if it is not the local municipality, police and fire officials and the medical officer of health.

(p) Provide the details, by attachment, of the relationship between:

- (i) the applicant and the site owner,
- (ii) the applicant and the occupier or person having the charge, management or control of the site, and
- (iii) the owner and the occupier or person having the charge, management or control of the site,

with respect to liability for any occurrences arising out of the use of the site as a waste disposal site.

(q) Provide the details, by attachment, of general liability and environmental impact liability insurance coverage carried relevant to this application.

6. Where the Applicant is not the owner of the land to be used as a site:

I (We), as owner(s), or acting as agent for the owner(s) of the lands described as the site in paragraphs 5(b) and (n) of this application, have knowledge of and agree to the proposed use of these lands as a mobile PCB destruction facility waste disposal site as set out in this application.

Name(s) of person signing:
Print of Type

Where owner(s) is a corporation, position held by person signing on behalf of corporation:

.....
Print or Type

Where person signing is agent, include documentation showing agency relationship.

Signature:

Date Signed:

7. The undersigned consents to the disclosure of any information contained in this application, including attachments, and any supplemental correspondence and information directly relating to this application except for that information which is specifically held to be confidential as set out by attachment to this application. In the case of supplemental correspondence and information, the applicant shall indicate what, if any, information is considered confidential at the time it is submitted.

8. Signed and dated on behalf of the Applicant:

Name:
Print or Type

Relationship to Applicant:
Print or Type

Signature:

Date Signed:

NOTE: It is an offence to knowingly give false information in an application made to the Minister, a provincial officer or any employee of the Ministry in respect of any matter under this Act or the regulations. (s. 145, Environmental Protection Act).

APPENDIX 3.1

RECOMMENDED SAMPLE COLLECTION METHODS

Procedures contained in this appendix are suggested methods. Alternate equivalent methods may be used with prior approval from the Ministry.

The reference procedure for sulphur dioxide is a manual wet chemical method. A continuous analyzer may be used. The type of analyzer and sample conditioning system proposed are to be approved by the Ministry.

1. Ontario Ministry of the Environment, Source Testing Code, (Version #2), A Report #ARB-TDA-66-80 Nov. 1980.
2. Ontario Ministry of the Environment, Field Investigation Manual, Phytotoxicology Section, Air Resources Branch, ARB-68-83-Phyto, April 1983.
3. Ontario Ministry of the Environment, Method for the Determination of Organochlorine Pesticides and Polychlorinated Biphenyls, Method Manual.
4. Ontario Ministry of the Environment, Method for the Determination of Polychlorinated Biphenyls in Oils, Method Manual.
5. Ontario Ministry of the Environment, A Guide to the Collection and Submission of Samples.

6. For Laboratory Analysis, Method Manual, April 1984 Version.
7. Ontario Ministry of the Environment, Method for Sampling and Analysis of Polychlorinated Biphenyls in Ambient Air, Air Resources Branch, Report AMP-137, Jan. 1984.
8. Ontario Ministry of the Environment, Method for Sampling for Trace Organic Contaminants, Air Resources Branch.
9. Ontario Ministry of the Environment, Ontario Source Testing Code Sulphur Dioxide, Air Management Branch, Jan. 1973.
10. Ontario Ministry of the Environment, Guidelines on Continuous Total Hydrocarbon Analysis of Point Source Emissions, Air Resources Branch.
11. Texas State Department of Health Air Pollution Control Services, Compliance Sampling Manual, Revised March, 1973.

APPENDIX 3.2
RECOMMENDED ANALYTICAL METHODS

1. Ontario Ministry of the Environment, Method for the Determination of Organochlorine Pesticides and Polychlorinated Biphenyls, Method Manual.
2. Ontario Ministry of the Environment, Method for the Determination of Polychlorinated Biphenyls in Oils, Method Manual.
3. Ontario Ministry of the Environment, Method for the Sampling for Trace Organic Contaminants in Incineration Emissions, Air Resources Branch.
4. Ontario Ministry of the Environment, Method for Sampling and Analysis of Polychlorinated Biphenyls in Ambient Air, Air Resources Branch, Report AMP-137, Jan. 1984.
5. Ontario Ministry of the Environment, Method for Sampling Sulphur Dioxide in Incinerator Emissions, Air Resources Branch, Jan. 1983.

